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BA/EN
WR SD
Mail Stop 60190

JUL 27 1990

Memorandum

To: ARD, Refuges and Wildlife (60130)
Attention: Ray Rauch

From: Regional Engineer, Region 6

Subject: 1989-1990 Annual Water Use Report/Management Plan

The subject report for Lake Andes National Wildlife Refuge has been reviewed. There was no mention of Water Permit No. 5250-3, Varilek WPA, or Water Permit No. 5251-3, Sherman WPA in Charles Mix County. Water use under these permits should also be reported.

Please extend our thanks to refuge personnel for the timely submission of this report.

/s/ WILLIAM A. GORDY

bcc: EN rf
Circ rf (2)
EN:LCoe:lc:7-16-90

1990 ANNUAL WATER MANAGEMENT PLAN
AND
1989 WATER CONDITIONS AND USAGE

LAKE ANDES NATIONAL WILDLIFE REFUGE COMPLEX
LAKE ANDES, SD

WATER UNIT: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake whose water level depends entirely upon annual runoff. Two dikes cut the lake into three units, the North, Center, and South. Stop log water control structures are located within each dike; however, the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962.

Unit	Drainage Area		Surface Acres of Water	Water Capacity (Acre Feet)	Depth/full	
	Acres				Max	Avg
South	20,000	24%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,000	100%	4,730	37,174	--	--

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the lake. The Fish and Wildlife Service received the right to flood the meandered lake bed of Lake Andes in an easement taken in 1939 from the State of South Dakota.

II. 1989 Water Conditions

Total precipitation for 1989 was 15.16 inches, 6.21 inches below normal. Just traces of snowfall fell during the January through March period that resulted in very little runoff. Water losses to percolation and evaporation were greater than precipitation and lake levels fell 1.30 feet during the year.

2.30⁷₀

1989 Lake Andes Water Levels - Feet MSL			
Date	North Unit	Center Unit	South Unit
03/25	Ice Out		
04/06	1435.60	1435.60	1435.60
05/01	1435.30	1435.30	1435.30
06/05	1434.95	1434.95	1434.50
07/05	1434.62	1434.62	1434.62
08/01	1434.90	1434.60	1434.35
09/01	1434.05	1434.10	1433.85
10/01	1433.55	1434.55	1433.54
11/03	1433.30	1434.30	1433.29
11/16	Freeze-up		
	- 2.30	- 1.30	- 2.31

III. Ecological Effects of Increased Water Levels In Lake Andes

A rapid increase in water levels occurred in 1986. Summer thunderstorms produced heavy rainfall that resulted in flood conditions which filled Lake Andes to 4 feet above outlet level. The rapid increase in water levels in 1986 drowned out approximately 95% of the cattail stands and reduced submergents. Since 1986, water levels have been falling and submergents have been responding, but perimeter cattail stands have been slow to re-establish.

Waterfowl breeding pairs totaled 507, down by 28% from 1988. This compares to a peak of 1127 pairs in 1983 when Lake Andes began to fill after a period of drought. The number of breeding pairs was the lowest in 1986 (364 pairs) when the highest water level in 50 years was recorded. The open water habitat with few emergents is less than ideal pair and brood habitat. While less than ideal migration habitat for teal, shovelers, and gadwalls, large numbers of mallards and snow and Canada geese used the lake for roosting habitat.

Large numbers of colonial nesting birds such as black-crowned night herons, snowy egrets, cattle egrets and great blue herons nested in flooded Russian olive trees in Johnson's Bay. However, water levels receded in 1989 so that the site of the main rookery is no longer flooded. In 1990, these species may no longer nest on Lake Andes.

Lake Andes continues to sustain a sport fishery. Fair populations of largemouth bass, yellow perch and bluegill exist in all units. However, a large population of bullheads continues to suppress the game fish populations. The fish population may be susceptible to winterkill during the winter of 1989-90. Water levels in all units are six feet or less.

IV. 1990 Water Management Objectives

Management objectives for 1990 are to contain as much runoff as possible in Lake Andes. Water in excess of the 1437.25 elevation mandated by Congress will continue to be released from the outlet on the South Unit.

WATER UNIT: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit, separated by a dike from the South Unit of Lake Andes. A stop-log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free flowing artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing reduced the well opening from 12" to 8" and dropped the flow to approximately 450 gpm.

In 1986, Ducks Unlimited funded the drilling of a new 12" artesian well and the old well was capped. The new well has a 800-1000 gpm flow. The well distribution box and pipeline supplying the Prairie Ponds were also replaced. In 1987 the four water control structures on the prairie ponds were retrofitted with new screw gates for better water control.

II. Objectives

Owens Bay water management objectives are to store annual runoff and artesian well water to be used primarily as waterfowl habitat. Waterfowl production is the primary objective on Owens Bay. The emphasis is on providing excellent breeding pair habitat and permanent brood water. Secondary objectives include providing waterfowl migrational habitat and benefits for marsh and water birds, shorebirds, gulls, terns, and resident wildlife.

III. 1989 Water Conditions

Owens Bay was drawn down as low as possible in 1987 to aerate the pool bottom and recycle nutrients in an effort to improve waterfowl habitat conditions. Since the drawdown, the bay has held less than four feet of water and has not filled to full pool because of drought conditions. The artesian well cannot entirely offset evaporation.

The winter of 1988-89 was mild and open resulting in minimal runoff from snowpack. Precipitation amounts for the year were 15.16 inches, 6.21 inches below normal. Early summer temperatures were warmer than normal thereby increasing the evaporation rate. Fourteen inches of snow fell in December but melted slowly and did not add to the wetlands.

1989 Water Levels - Owens Bay

<u>Date</u>	<u>Water Level</u>
04/06	1440.88
05/01	1440.68
06/05	1440.20
07/05	1439.80
08/01	1439.42
09/01	1438.94
10/01	1438.50
11/03	1437.50
11/16 Freeze-up	
Pool Bottom	1436.52
Full Pool Elevation	1442.12

IV. Ecological Effects of the Past Years Levels on Owens Bay

Pool levels remained low because of the drought. The number of waterfowl pairs in 1989 was 137 pairs, down 20% from 1988.

Perimeter emergent vegetation species increased and provided good brood habitat throughout most of the summer.

V. 1990 Water Management Objectives

Water management activities for 1990 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset annual evaporation. The entire well flow will be diverted into the north prairie ponds during March. The ponds should be filled within a 3 week period. The flow will continue to be diverted through the pond complex and into Owens Bay. The well will again be diverted directly into Owens Bay prior to fall freeze-up.

WATER UNIT: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA is a 2650 acre tract in Douglas and Charles Mix Counties, SD. Two drainage systems existed on the property when purchased. The Mud Lake Drain has an upstream watershed of 25,600 acres, while the second system, the Joubert Drain, has a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop-log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the Joubert drain. Dam #6 was constructed below dam #2 on the Mud Lake drain in 1984. Dam #7 on the Joubert Drain was constructed during the fall of 1986 in cooperation with Ducks Unlimited who funded the project design and construction. A water rights permit for the storage of 131.2 acre feet of water was granted by the South Dakota Department of Water and Natural Resources. The impoundment at capacity covers 56.4 surface acres. The development increased the quantity of pair habitat by creating 5.9 miles of shoreline. The maximum depth is 6.5 feet. Design specifications for the seven dams are as follows.

Embankment Volume YD ³	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 - 76	Unk	6.2	5.7
Dam #2 - 755	Unk	27.9	82.6
Dam #3 - 2761	Unk	43.6	163.0
Dam #4 - 586	Unk	34.7	88.3
Dam #5 - 137	Unk	6.3	5.2
Dam #6 - 900	Unk	30.0	Not determined
Dam #7 - 5470	1526.0	56.4	131.2
TOTAL		205.1	476.0

The capability to manipulate water levels is very limited on the Broken Arrow WPA. Impoundments can be drawn down as objectives dictate. However, to reflood depends on spring runoff and no capability to flood when desired is possible.

II. Objectives

The storage of annual runoff in impoundments is to be used primarily as waterfowl production habitat. The habitat provided also benefits marsh and water birds, shorebirds, gulls, terns, and raptorial birds. Secondary benefits are provided to resident wildlife and livestock used for management purposes. Water excess to storage needs is allowed to drain through the system.

III. 1989 Water Conditions

The winter of 1988-89 was mild and open resulting in minimal runoff from snowpack. Precipitation amounts for the year were 15.16 inches, 6.21 inches below normal. Impoundments 2 and 4 partially filled with runoff on their respective drainages. The rest of the impoundments held little or no water. By August all impoundments on Broken Arrow were dry. Water that remained in dugouts was used for livestock watering.

IV. Ecological Effects of the Past Years Water Levels on the Broken Arrow WPA

All impoundments were dry by August thus killing most carp in the system. The two exceptions are impoundments 3 and 4 which dugouts within their basins could carry over a remnant carp population.

The pool basins had an excellent growth of hydric plant species and should provide ideal pair and brood habitat once the drought has broken.

V. 1990 Water Management Objectives

Water management objectives for 1990 are to contain as much spring runoff as possible in all pools.

WATER UNIT: Karl E. Mundt National Wildlife Refuge

The Karl E. Mundt NWR borders the Missouri River in Gregory County. The refuge was established in 1974 to protect habitat important to wintering bald eagles. The only water on the unit itself are four small (less than 1 acre) stock ponds that are used in conjunction with the grazing program. There is also a free-flowing artesian well that provides water for a small 1/2 acre pond.

There presently is no active management of water on the Karl E. Mundt Refuge.